UNION LEAGUE CLUB.

REPORT

OF

COMMITTEE ON POLITICAL REFORM

ON THE SUBJECT OF THE

Water Supply and Distribution of the City,

INCLUDING THE QUESTION OF

Removing the Murray Hill Reservoir

AND THE

RESOLUTIONS OF THE CLUB THEREON AND IN FAVOR OF AN ACT FOR A COMMISSION TO REPORT ON THESE QUESTIONS TO THE NEXT LEGISLATURE.

Prepared by Mr. Gen. B. Butler

New York:
PRINTED BY MEMBERS OF THE CLUB.
1880.

Explanation of the Maps, etc., Annexed.

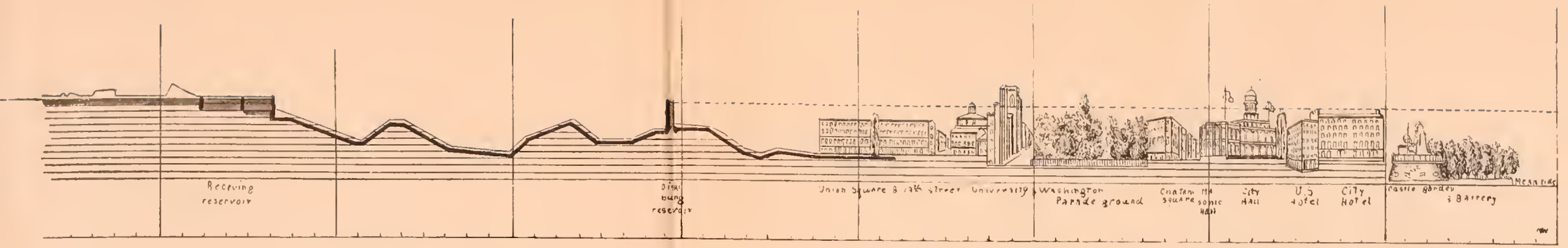
No. 1. Profile of the city below Ninetieth Street, showing position of Aqueduct and old Receiving Reservoir in Central Park, top water-line in both, when full, 119 feet above mean tide, and also of Murray Hill Distributing Reservoir, top water-line when full, 114 feet 10 inches above mean tide, with a line drawn from it over the buildings in the city as they were in 1843, showing that the water from this Distributing Reservoir would flow upon their roofs. (From Schramke's work on the Croton.)

No. 2. Map of the city showing the seven mains proceeding from the Central Park Receiving Reservoirs, and how six of them at Forty-second Street are, by a cross main, united with the Murray Hill Distributing Reservoir; also their union below it by another cross-main, so as to have one system for all that portion of the city below the Reservoir, and that the combined pressure may be directed to any part of the city below, where required by emergencies.

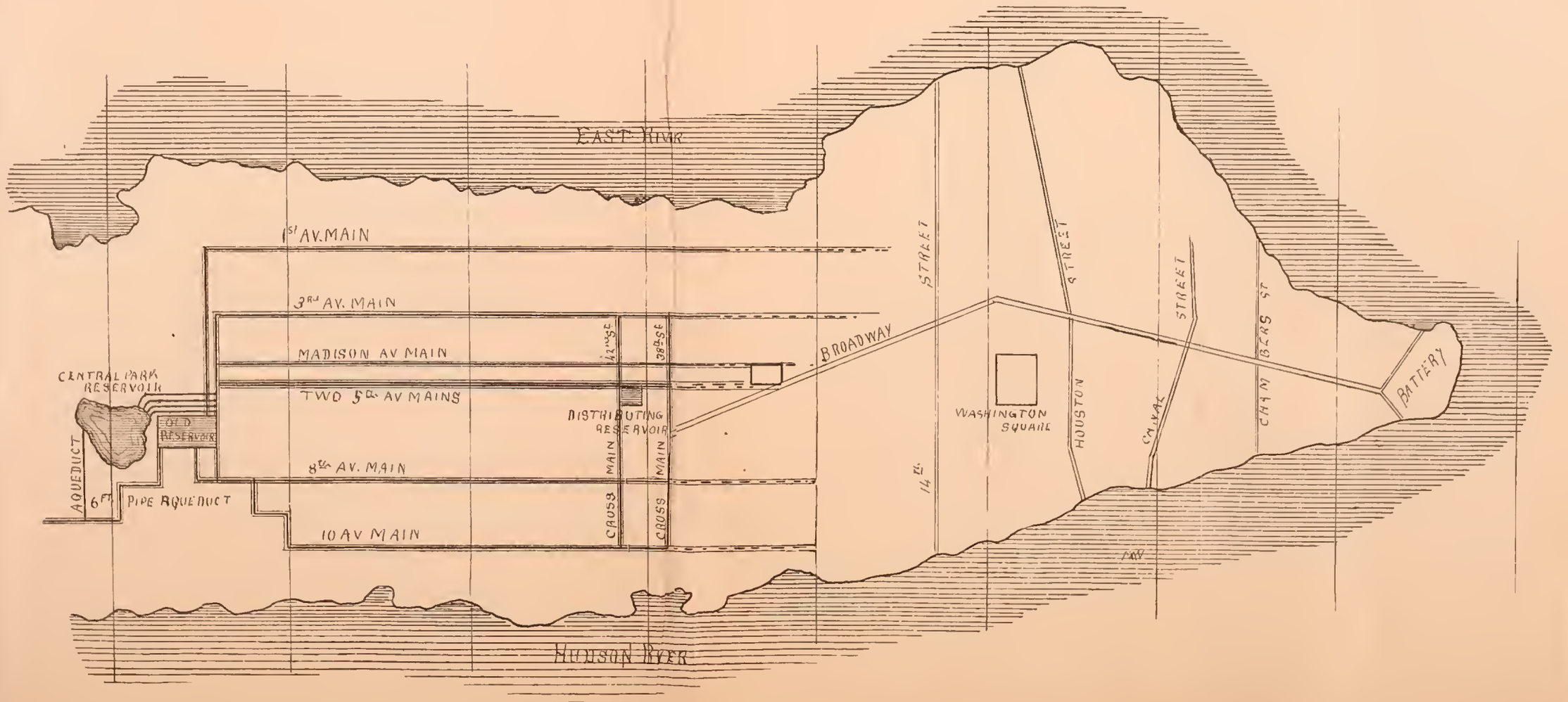
No. 3. Isometrical drawing of the Murray Hill Distributing Reservoir taken from Tower's work, showing that the structure is not offensive to the eye, and may be made ornamental with vines. Its water may be covered and a park thus formed above.

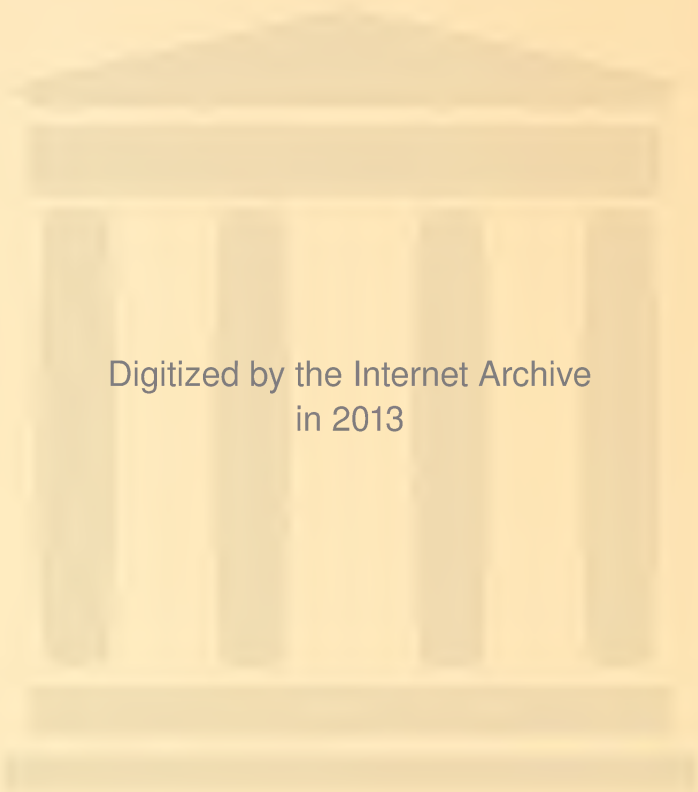
No. 4. Plan of interior of Murray Hill Distributing Reservoir with the two pipes of thirty-six inches diameter each, now entering it at Forty-second Street and leaving it at Fortieth Street, also the third pipe intended for an influent pipe by Mr. Jarvis. The double walls prevent any leak from extending to the outside wall. The arches are to permit persons to pass between both walls and around the interior wall, to detect and prevent leaks. It does not leak and is perfect in all respects.

No. 1.

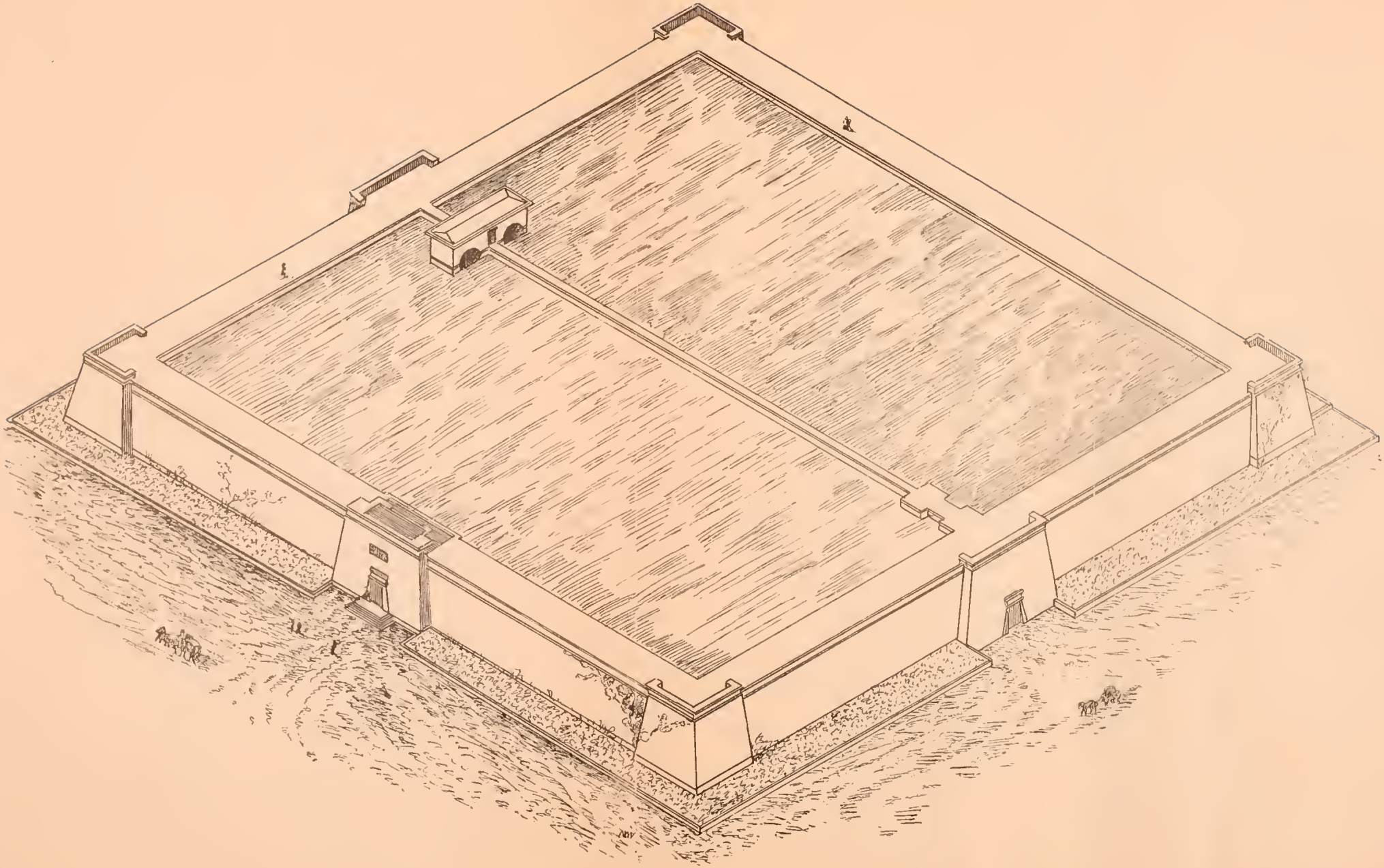

Receiving reservoir
Distributing reservoir
Union Square & 17th Street
University
Washington Parade ground
Croton Fountain Square
Masonic Hall
City Hall
U.S. Hotel
City Hotel
Castle Garden & Battery
Meadows

No. 2.

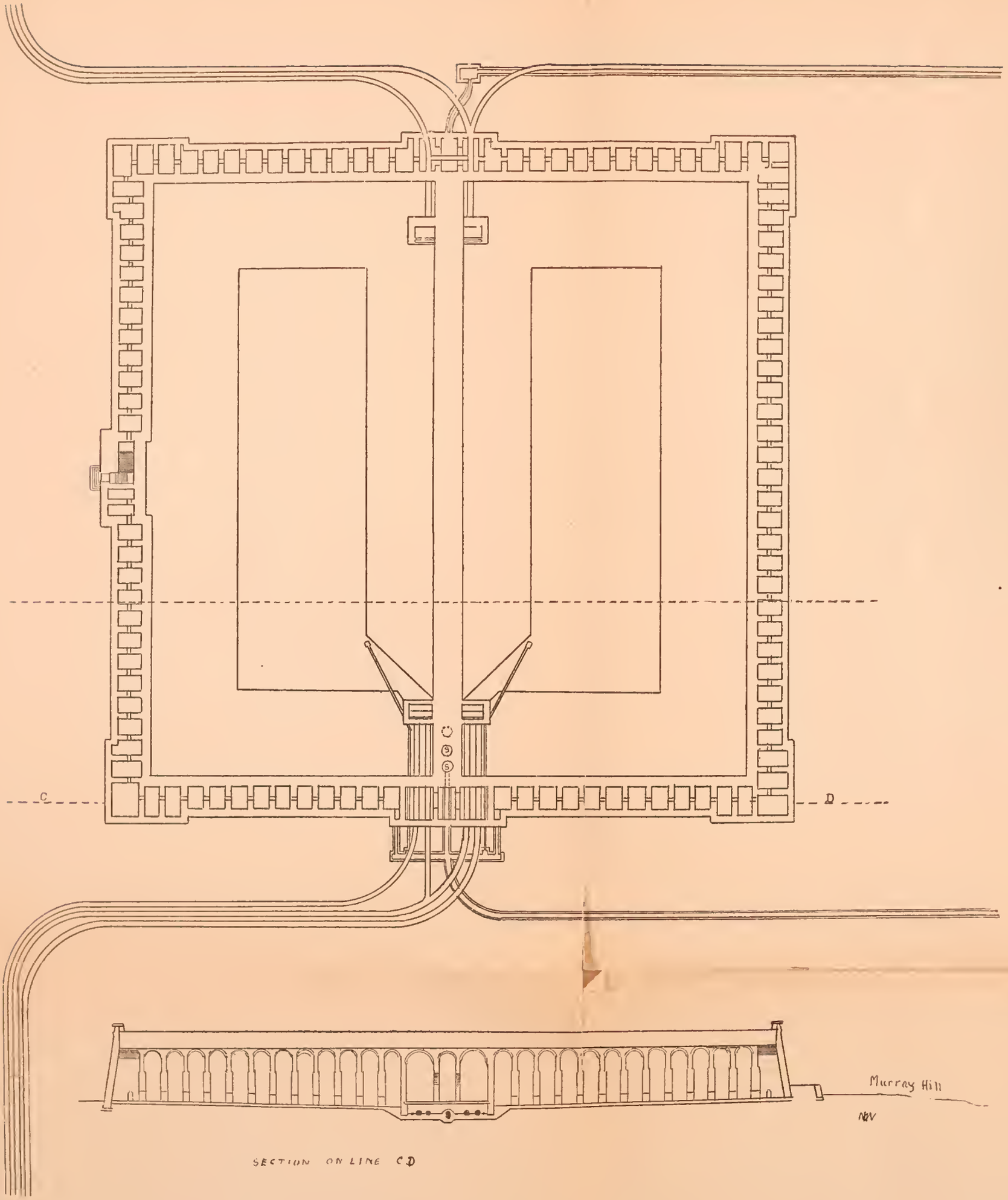

EAST RIVER
1st AV. MAIN
3rd AV. MAIN
MADISON AV MAIN
TWO 5th AV MAINS
8th AV. MAIN
10 AV MAIN
CENTRAL PARK RESERVOIR
OLD RESERVOIR
AQUEDUCT
6FT PIPE AQUEDUCT
DISTRIBUTING RESERVOIR
42nd St
38th St
CROSS MAIN
CROSS MAIN
BROADWAY
4th STREET
WASHINGTON SQUARE
HOUSTON
14th
CANAL STREET
CHAMBERS ST
BATTERY
HUDSON RIVER



No. 3.



No. 4.



SECTION ON LINE CD

REPORT

OF

Committee on Political Reform.

THE 4th § of the Articles of Association makes it the duty of the Club to promote reform in our State and Municipal affairs, and by the 14th § of the By-Laws the "general charge of all matters relating to" this duty is conferred on the Committee of Political Reform.

The Committee, in view of the numerous and very important matters which are up for legislative and municipal action, connected with our water supply and distribution, have determined, after careful deliberation, to present the whole subject to the Club in order that necessary reforms may be accomplished.

Those matters are the following; and the question for the Club to decide is this; Whether the whole of them or part of them should be committed to a commission to be appointed by the Governor, by and with the consent of the Senate, as was done when the introduction of the Croton was projected in 1833–34; or whether they shall be allowed to run their chances in the Legislature and be severally passed upon as interest in behalf of each may be exerted. A bill for the creation of such a commission was passed in the Assembly last winter, but was not reached in the Senate. A bill of like character has been introduced into the Assembly at the present Session.

Enumeration of subjects to be acted upon by a commission:

1st. The Commissioner of Public Works of this city, Allan Campbell, Esq., is now engaged in acquiring title to lands for the construction of an aqueduct from the Bronx and Byram Rivers to the city of New York, at the estimated cost of $3,000,000.

2d. Surveys have been made for an additional aqueduct of nearly forty miles in length, from the Croton Valley to the city of New York, to cost, including the necessary reservoirs and distributing pipes, as stated in the report of Commissioner Campbell for August 12th, 1876, $15,000,000 to $20,000,000. By the report of November 12th, 1876, at not less than $20,000,000. In the report of August, 1879, the cost of the aqueduct, including two new storage reservoirs, is stated at only $12,000,000.

But as Mr. Campbell, in his report for the second quarter of 1878, stated the cost of our water system, including aqueducts, pipes, structures, maintenance, and repairs, at nearly $36,000,000, and the new aqueduct from the Croton is to be on a line thirty feet higher than that of the present structure, and one half larger, the estimate of $12,000,000, now that work, labor, and materials have undergone a recent large advance, must be regarded as exceedingly moderate.

3d. As a feeder to this new and enlarged aqueduct from the Croton, when it shall be built, a survey has been made for a canal to connect the waters of the Housatonic River in Connecticut with the east branch of the Croton, and thus supplement the latter with 100,000,000 gallons daily. The cost of this work exclusive of water rights is estimated at $2,500,000.

Of these three works—the aqueduct from the Bronx and Byram Rivers, the aqueduct from the Croton Valley, and the feeder from the Housatonic, only one has been commenced—that from the Bronx and Byram ; but there is the same authority for the simultaneous commencement of the whole of them as for any one. It was obtained in this wise :—

An act was passed on the 16th of last June, a few days before the close of the Session (Chap. 516), amending the title and the repealing clause of an act passed in 1877 (Chap. 445). By this expedient an act was revived, passed in 1871 (Chap. 56), which authorized the construction of aqueducts, reservoirs, canals, etc., and another act (Chap. 328) was also revived limiting the expenditure to $1,000,000 in any one year.

The Commissioner of Public Works states that these acts, and Chap. 476 of the Laws of 1875, authorize him to expend such sums *as he may deem necessary for increasing the water supply* not exceeding $1,000,000 in any one year, and he may go on with this until all these works are completed. The time

required for building the aqueduct from the Bronx, "might," he says, "be somewhat shortened if the limit of $1,000,000 per annum could be exceeded." Authority for this will probably be asked for.

In addition to this, authority was granted to the Commissioner, by Chap. 381 of the Laws of 1879, to extend the distribution of water over the city and expend in so doing not exceeding $250,000 per annum, depending on the assent of the Board of Apportionment, which has been given, and that of the Common Council. By Chap. 480 of the Laws of 1879 an expenditure of $12,500 per annum may be made by him for taking water from the Yonkers Water Works and carrying it into the new wards.

For repairs of aqueduct, ordinary and extraordinary, $294,000 was granted by the Board of Apportionment. These expenditures amount in the aggregate to over $1,500,000 per year.

The principal act revived by thus amending the title and repealing clause of the act of 1877 is the famous Tweed act passed in 1871 for the construction of aqueducts, reservoirs, etc. The Legislature, in 1875, in view of the extraordinary powers conferred, provided by Chap. 477 that they should not be exercised except with the concurrence of the Common Council and the Mayor. The act of 1877, Chap. 445, limited the power to raise money under it to aqueducts, etc., then in the course of construction, and repealed all acts inconsistent with it. This repealing clause, by the amendment to it of last June, already referred to, was made to revive the act of 1871 so as to sweep away any control of the Common Council and annul the provision that the power to raise money should be limited to aqueducts, etc., then in the course of construction! No citizen of New York, probably, interested in discreet legislation, knew that the construction of an aqueduct or aqueducts was asked for or granted by this device or any other, and it is not probable that the Legislature understood the design of this legislation.

Its immature character may be judged of from the fact that the head-waters of the Byram River, a short distance from its entrance into Connecticut (through which State it passes until it becomes the boundary), are to be cut off by Mr. Campbell and diverted to New York without the consent of Connecticut; which may restrain the exercise of the power. It is a remarka-

ble feature of this scheme that while notice of the bill authorizing the expenditure of $250,000 was communicated in the report of the Commissioner of Public Works, no mention whatever was thus made of the pendency of the bill for the large expenditure of $1,000,000 per annum (without limit of time) for constructing aqueducts, reservoirs, etc.

So far as concerns the feeder from the Housatonic, it appears by the report of the Board of Health for the State of Massachusetts that there are over sixty mills on the head-waters of the Housatonic in that State, chiefly woollen, paper, and cotton mills, which pour the poison of their refuse and that of the population into the stream. It is mentioned also that a son of one of the professors of a college in this city, from bathing in the river at Stockbridge, contracted a skin disease from the dyes of these mills which he encountered.

The Valley of the Croton, on the contrary, has no mills of this description within it, and its waters are free from defilement, and should be maintained in that condition. The introduction into it of water from the Housatonic not only would poison it but is wholly unnecessary. A distinguished late member of this Club, Mr. Alfred W. Craven, as Chief Engineer of the Croton, made a survey of the valley which consists of 338 square miles, and laid down on his map fifteen places at which storage reservoirs could be constructed. Two of them have already been constructed in order to supply the city in a season of drought, so that, added to the minimum flow in the summer, sufficient water to supply the present aqueduct may be furnished. This object is nearly, if not quite, accomplished by two of the fifteen thus located. Should a new aqueduct be built, all authorities agree in stating that by constructing three or more capacious storage reservoirs abundant water for it could be furnished. The water pouring over the Croton dam for nine months of the year, and wasted into the Hudson River, would more than supply the new aqueduct for that time, and the storage referred to would fill it in the summer.

4th. The Commissioner of Public Works complained in August last that the Board of Apportionment of the city refused to appropriate a sufficient sum to enable him to repair the aqueduct. The appropriations for 1880 have since been made. Eight thousand feet have been repaired. The quantity needing repair during this year is 14,000 lineal feet, and during 1881, 22,000. Of these, 4000, he says, should receive immediate attention.

The parts thus requiring repair are where a stream or ravine is crossed, and there are 125 of such places. In all of them the aqueduct, which is of rigid masonry rests, on rubble-stone foundations, built up without mortar, varying from 100 to more than 1000 feet in length, and from 10 to nearly 40 feet in height. This rubble foundation has not in all cases proved sufficient to sustain the aqueduct.

Mr. Benjamin S. Church, a member of this Club, is the engineer in charge of these repairs, and he thus referred to them, in January, 1876, in his address, published by the Society of Civil Engineers. Mr. Campbell, just about this time, entered upon the duties of his office as Commissioner of Public Works :

"In some places these foundations have settled and disturbed the even bed of support of the aqueduct, especially as the tendency of this settling is to spread the wall ; consequently, on all these embankments between Croton dam and the city, the aqueduct has split longitudinally through top and bottom, being torn asunder by the above-mentioned forces, causing leaks of a more or less serious nature. Some of these leaks during a sudden and severe change of weather become so alarming as to make it necessary to shut off the water at Croton dam and empty the aqueduct for repairs, which can be made only inside." After describing the character of the repairs, he adds : "A thorough renewal of the broken parts would, however, require a longer stoppage of the water supply than the city storage now allows ; therefore repairs heretofore made, although the best that conditions permitted, have been temporary and imperfect."

Mr. John B. Jervis, who constructed the work, urged, in what was regarded as his farewell address, that the water in the aqueduct should be turned from it in the spring and fall of every year for the purpose of making inside repairs ; but the fall of 1878, and the spring and fall of 1879, had to be passed without making them, owing to the want of a sufficient head of water in the city reservoirs to permit it with safety.

Early in January of last year the Central Park Reservoir contained 29 feet, but the quantity was reduced to 19 feet, owing principally to the cold weather, and to the necessity of letting the water run in houses to prevent freezing in the pipes.

The Commissioner says : "When the water of the aqueduct is drawn off, the cracks are repaired from the inside, large

forces of men being employed night and day in this work and in general repairs, and cleaning the aqueduct for about seventy-two hours, which is as long as the water supply can be shut off without too great a draught on the Central Park Reservoir, and even this suspension reduces the level of that reservoir about 8 feet."

It will thus be seen that if a break of any great magnitude should occur, the storage capacity in the city might be far from sufficient to permit the work of reparation or reconstruction before a water famine would ensue.

It is well to look squarely in the face the effect of being thus deprived of the Croton. All trade and industry would stop, and the city be depopulated. It would be exposed to pillage, and should a fire then occur, it would be disastrous.

5th. On the subject of waste of water in the city the matter stands thus :

For many years after the introduction of the Croton, the area or size of the aqueduct was greater than that of all the taps combined, and consequently but little trouble arose from the waste of water ; but the size or area of the aqueduct being but $53\frac{34}{100}$ square feet, and that of the taps now over 160 square feet, it is easy to run off through 160 square feet what may be brought in through a conduit of only 54. The faucets are in the hands of the most thriftless part of the community, and they commit waste with impunity, especially in the winter. By means of it the head is lowered in houses, so that sewer gas penetrates them and the danger from fires is increased.

Humber, in his valuable work on water supply, says : "The effective pressure should be such that the highest stories in the most distant parts may be supplied, and, further, that the roofs may be commanded by jets from the mains without the assistance of fire-engines."

Tried by this test, the water system of the city is practically a failure. To remedy this, waste must be stopped or more water introduced ; but if more shall be introduced and no check applied to its use, the additional quantity will also be wasted, if there is power to do so.

The experiments to test this in England show that 285 gallons per head per diem were used for a whole year, when water was delivered under pressure and there were no meters —this is three times the quantity of water per head per diem

brought in by our aqueduct—and the conclusion has been deduced from this, and similar experiments, that wherever water is received in large cities under pressure, and there is power without restraint to exhaust it, it will be exhausted.

Mr. Denton, in one of his valuable lectures before the School of Military Engineering, at Chatham, in England, says that waste exists always where there is a want of *effective control and proper appliances*. Our water system suffers from both of these causes. The plumbing is defective, and it is placed in positions which expose its contents to frost, and there is but partial control over the waste.

In 1870 an act was passed authorizing meters to be applied to all buildings, etc., except offices, tenement-houses, and dwelling-houses, but little has been done under it until recently. Within a few months meters have been applied to hotels, and their consumption of water has been reduced to one third of what it was. The meter is now being applied to livery stables, and the saving there will be immensely greater. But the chief waste in the water is in the houses not named in the list of those which may be metered—those which let the water run to save the pipes from the effect of water freezing in them ; and this, the Commissioner says, he has no power to stop. Nor has he power, as he says, to prescribe the character, strength, or position of the plumbing work. Hence without check the waste proceeds which so injuriously affects the health of the occupants of houses and exposes property to destruction from fire.

To remedy this a bill was laid before the Assembly Committee on Cities of the Legislature at its last session, which emanated from the Municipal Society, but it did not receive the support of those who wished to obtain power to construct a new aqueduct, on the ground that more water was necessary, and the bill did not pass.

This was unfortunate, as the stoppage of preventable waste would have been immediate in its effects, and might have demonstrated that an expensive aqueduct in the present condition of our finances could be deferred, whereas it will take five or six years to construct an aqueduct from the Croton ; and even the small line from the Bronx and Byram cannot be completed under three or four years ; the land for it not yet having been procured, and the consent of Connecticut not given.

An act to stop this waste might easily have been procured by the Commissioner from the Legislature at any time, if like efforts had been made for the purpose to those which were made for authority to build aqueducts; but it has been neglected, and the waste has reached frightful proportions. The extent of the power which should be conferred, and the safeguards against its improper exercise, are fit subjects for examination by Commissioners. In England an appeal is allowed to a magistrate to settle disputed questions.

Appropriate remedies against waste should have grown up with the water system. The long neglect of this precaution has occasioned habits, and given rise to ideas, opposed to any restraint such as render the service of an intelligent Commission highly necessary. If it shall be shown that stopping the waste will restore our water system to the condition which Humber describes, and thus contribute to public advantage on the score not only of health but of safety from fires, the public will assent to the just exercise of power to stop waste.

6th. Notwithstanding the cracked, leaky, and dangerous condition of the aqueduct, and the manifest insufficiency of the storage capacity in the city, the residents in front of the Murray Hill Reservoir of whom Mr. William H. Vanderbilt was one, applied for its removal. It was built not for them, but for the city below. The Commissioner of Public Works supported the removal, but under a serious misapprehension as to the condition of the aqueduct, he said in his report for the quarter ending June 30th, 1876, "Fortunately, the good condition of the existing aqueduct, and its capacity amply to supply the present population, has been proven." It was not until after the bill for removal had been presented to the Legislature, and not passed, that Mr. Campbell, in his quarterly reports, startled the community with a statement of the condition of the aqueduct and the necessity for immediate repairs to make the structure safe.

The friends of removal now shield themselves under the erroneous opinion of Mr. Campbell thus expressed (he is not an Hydraulic Engineer), claiming that he alone is to decide the question. But no such power has been given to him. On the contrary, he is charged with no other duty than that of the repairs and preservation of the reservoir. The ground he presents in support of its removal is that it holds only

24,006,000 gallons (this being less than one third of a day's supply), and is therefore unimportant as compared with the larger storage capacity in the Central Park Reservoirs, which hold 1,250,000,000 gallons when full. This misconceives the object of its creation, which was distribution, and storage only so far as it accomplished distribution. Its storage capacity is, however, 600 gallons for each of 40,000 houses. Its great service consists in this, that it accumulates in the night from the six mains which press their surplus into it a quantity of water two miles nearer to those it supplies in the ensuing morning than are the Central Park Receiving Reservoirs. All the mains except the one in First Avenue are united with this Murray Hill Reservoir by an inflow cross-main at Forty-second Street, and united together in Thirty-eighth Street, by an outflow cross-main, so that the equalizing pressure of the reservoir and mains may be felt in the district below which the reservoir commands. The top of its water-line when full is 114 feet 10 inches above mean tide. The roof of the University Building being only 108 feet above mean tide, the water from this reservoir when full can easily be thrown upon its roof. The reservoir can be filled and kept full if the waste be stopped, and thus the former condition and usefulness of the reservoir be restored. But the service now rendered by it every day is ample reason for holding on to the structure.

The Commissioner also supports its removal on the ground that mains have been laid of sufficient capacity to carry the water past it instead of through it to consumers. He can, by a short connection of those mains with the aqueduct itself, carry the whole flow of the aqueduct past instead of through the Central Park Receiving Reservoirs to consumers. If the Commissioner should suggest this as a reason for dispensing with the Receiving Reservoirs in the Park, the inapplicability of the reason as one to justify the removal of any reservoir would be apparent. We should be stripped of all our reservoirs on the ground that he could carry the water which they are to hold and accumulate and distribute, past instead of through them.

The Commissioner also contends that he can accomplish the same advantage by the mains now existing that he can by the mains and distributing reservoir combined. The distance from the Park Reservoirs to the Battery is nearly six miles,

and his theory amounts to this, that a reservoir between these extreme points, holding when full 24,000,000 gallons, into which the water is pouring all night long from six of the seven city water mains, adds nothing to the pressure in the mains below when the morning's delivery commences, and that the water in the mains below is as readily exhausted as if the 24,000,000 gallons had not, by the night's accumulation, been brought over two miles nearer to consumers. The mere statement of the position makes its refutation unnecessary. The accumulated water held at the half-way position is so much added at that point to the capacity of the mains. In case of a fire in the lower part of the city, it furnishes an immediate supply two miles nearer than are the reservoirs in Central Park.

No complaint is made that the reservoir on Murray Hill does any harm in the water system of the city. It does not leak ; on the contrary, it is in perfect order. It has two walls, an outer and an inner wall, with an archway between, so that persons entering it at Forty-second Street may walk entirely around between its walls so as to detect any leaks through the interior wall. The water which occasionally appears on the outer wall is wholly from rain falling upon the flagged work above, and is hurtful only to those who imagine for it a different source. No harm, therefore, will result from waiting for the report of intelligent Commissioners.

No one would think of removing the Reservoir if it were anywhere else ; but there is no other corresponding elevation, and the structure was used long before any buildings were erected around it. It was not until the residents of Murray Hill obtained their supply of water from the costly High Service System—constructed at the expense of the city—that the removal of this Reservoir was attempted. It is on account of its benefit to residents below Murray Hill that removal is resisted. They insist that it shall be retained until a body of disinterested Commissioners decide in favor of removal, after a thorough investigation. The ground that another intermediate Reservoir, to take the place of this, may be constructed in some other location should have no weight, as it will take several years to build it. No appropriate location exists commanding the roofs of houses below Murray Hill.

The bill for removal seeks to accomplish it without the consent of the Mayor, Aldermen, and Commonalty, to whom

the title was granted under ancient charters and without the consent of the Sinking Fund Commissioners, to whom the proceeds of all lands sold are pledged as security for debts.

This bill seeks to apply the land to a purpose other than that for which it has long been used, and is in derogation of the rights of the city, and ought to be resisted as being the assertion of legislative power over all lands belonging to the city, and even the aqueduct and other reservoirs. The Sinking Fund Commissioners remonstrated against its passage on this ground, and because the reservoir was a necessary part of our water system. Their action ought to be sustained.

Whatever may have been the law as laid down in the case of Darlington against the Mayor in 31st New York Reports, the Legislature, with a view to afford a remedy to the city against its injustice, in 1878, Chap. 383, § 4, passed an act declaring that, as between the city and the holders of its bonds and stocks, the pledge of certain of its revenue and funds as security for the payment of principal and interest should be deemed to be a contract—a position which exempts not only these revenues and funds from the power of the State, but also the property which produces them.

Mr. Henry A. Oakley, President of the Board of Underwriters, stated in writing to the secretary of this Committee that at a meeting of insurance companies the most interested in New York risks, they unanimously authorized him to state that they were against the removal of the Reservoir, except it was recommended by disinterested Commissioners who had given the subject a thorough examination.

The Association of Hotel Proprietors also unanimously remonstrated against its removal, and recommended the passage of Mr. Mitchell's bill for the appointment of a Commission.

When the Croton was projected in 1833–34 as the source of supply, five Commissioners were appointed under a law of the State to consider and report upon the subject. They were :

STEPHEN ALLEN,
WILLIAM W. FOX,
SAMUEL ALLEY,
CHARLES DUSENBURY, and
BENJAMIN M. BROWN.

And it was on the strength of their able report in favor of an aqueduct from the Croton River to Murray Hill that the city in 1835 voted in favor of their plan.

The expenditure now required for a new aqueduct from the same valley will be much larger than was supposed to be necessary then. The other matters above stated all relate to the water system of the city, and involve questions of great importance—the most important of any which can arise in our Municipality—and if not settled by Commissioners to be appointed under the act in question, they will be acted upon severally and a result arrived at in each depending upon the influence which persons interested in it may be able to exert at Albany or over the city authorities, as the case may be—a situation not favorable to a wise result. No expenditure ought to be allowed under the peculiar legislation of last winter, nor should the construction of an aqueduct be permitted until thoroughly canvassed and understood by the community. It has been well observed that an engineer who should recommend the immediate construction of an aqueduct might be suspected of a stronger wish to connect his fame with a great work than to be governed by considerations of prudence, and if he were connected with either of the political divisions of the city, there would be distrust of his opinions and fear that he would exercise his power to aid his political faction. A body of disinterested Commissioners appointed by the Governor by and with the advice and consent of the Senate would not excite the suspicions which affect the confidence of the public, and their action would probably be the means of settling forever these important questions.

They therefore recommend the following resolutions :

Resolved, That the Murray Hill Reservoir ought not to be removed until a Commission of disinterested persons shall, after thorough investigation, recommend such removal.

Resolved, That the bill for the appointment of Commissioners introduced into the Assembly by Mr. Mitchell ought, in the judgment of the Club, to pass.

DORMAN B. EATON, *Chairman.*

The report was accepted, the resolutions were adopted at the monthly meeting of the Club, held February 12th, 1880, the Hon. Hamilton Fish presiding, and it was ordered that the report and resolutions be furnished to the press for publication.